FINAL DRAFT

WORKING GROUP ON PROFESSIONAL DEVELOPMENT

In-service Teachers Professional Development Models in the Use of Information and Communication Technologies

A Report to the SchoolNet National Advisory Board

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TABLE OF CONTENTS

Introduction	3
Chapter 1 : Conceptual Framework and Methodology	5
Professional development framework	4
Qualities of professional development	6
Methodology	9
Chapter 2 : Models at Work	12
1. School-based models	12
2. District, Group of Schools, and Partner-driven Models	22
3. Provincial and Canada-wide Programs/Initiatives 31	
Chapter 3 : Teacher professional development: Full spectrum, full picture ?	42
What is involved ?	42
Who is involved ?	43
What is learned combining face to face and online communication ?	44
What works ?	44
What does not work ?	45
What are the models ahead ?	45
Recommendations	46
References	50
Appendix A : Terms of Reference	52
Appendix B : List of contributors	53
Appendix C : Template	54

INTRODUCTION

Kirkpatrick and Cuban (1998) pointed to the dismissal of the teacher's role in their critique of the research on the efficacy of technology in education in computer-assisted instruction (CAI) and computer-managed instruction (CMI). Contrary to CAI and CMI, they observed in computer-enhanced instruction (CEI) that "Teachers are viewed as essential to the learning process, because simply seating students in front of their computers to surf the Net will not result in the same learning curve as when teachers assign well-designed projects in which students use the Net to gather information". This report adopts a view that the teacher's role is critical in the use K-12/13 learners make of multimedia computers linked to other computers throughout their schooling process.

Network technology, however, opens new teaching and learning possibilities, and creates new challenges for the teacher. Professional development becomes key, in addition to access to computers and to the electronic network.

Strong with their own experience, and empathic to the many calls that are made for more professional development in the effective use of online resources and tools, the SNAB Committee members identified the need to create a Working Group on Professional Development (Teacher ProD) Committee, and established the following mandate:

> To examine the needs of educators who are or will be involved in the use of ICT in learning and to make recommendations to Industry Canada officials on how the SchoolNet Program could be used to support the professional development and technical assistance required by them.

As the Working Group moved to understand teacher professional development pertaining to the integration of ICT in formal learning more in depth, a study was undertaken to describe both the pre-service and in-service professional development models in use in Canada. One team was responsible for the survey on pre-service teacher education (see Owston, 1999), and the other team reviewed professional development models and initiatives for in-service teachers, with the exception of university-based models that were to be covered by a separate team (See the Terms of Reference, Appendix A).

This review was conducted over the last month. In no way was it intended to survey models and initiatives in an exhaustive manner. Rather, the reader is invited to consider this report as an illustration of what is, and of what could happen on a broader scale.

The document presents an overview of what is being perceived as successful models and initiatives in the K-12/13 sector. It also includes limited elements relating to the post-secondary sector (colleges and universities). Success is understood in relationship with the norms of the situation in which a particular model is being applied; it is the recognition of the success of a model in its own local/regional/national context. Success here is to be separated from one's own values, or philosophy, and reflects the decisions of a particular organizational culture. [1]

[1] We extend our appreciation to the members of the SNAB Working Group on Professional Development for providing exemplary materials. We also thank the following graduate students who contributed to this review and/or writing of the report: Angela Rashotte, Nathalie Chabot, and Sandrine Turcotte. Our thanks also go to Valerie Gafka of TeleLearning Network Inc.

Chapter 1

Conceptual Framework and Methodology

Professional development framework

The first chapter outlines a framework for investigating professional development initiatives and models for educators in and with information and communications technologies in Canada. Literature was reviewed in order to offer a working definition of professional development in the context of current uses of networked computers in K-12/13 classrooms, and suggest a perspective for understanding surveyed initiatives and models.

Traditionally, staff development has been defined as "the provision of activities designed to enhance the knowledge, skills and understandings of teachers in ways that lead to changes in their thinking and classroom behaviour" (Fenstermacher, and Berliner, 1983). Professional development is a notion inclusive of the concept of reflective practice, a now well-recognized element in teaching. "What teachers take away from professional development efforts is based on their existing knowledge and beliefs. Rather than having information delivered to them, teachers need to examine their beliefs about subject matter, student learning and instruction in the light of innovation" (Marx, Blumenfeld, Krajcik, and Soloway, 1998, p. 33). This is to say that the search for professional development models was to be attentive to both technical and practical knowledge, along with a distinction that goes back to Aristotle. As redefined by Tafel and Bertani (1992), staff development is a way for "people to change and move toward their own carefully articulated goals to improve their schools, their relationships with each other and the teaching processes for students" (quoted by Sideris and Skau, 1994).

As the development of the intellectual autonomy of children is concerned, the direction of the change that appears most desirable was recently formulated in the "teach for understanding" approach (Bereiter, in press). Teachers do care for understanding, suggests Bereiter. He adds: "Teaching for understanding is a sharable vision of possibilities not yet fully discernible. There is a need for research that will be appreciated by everyone who gets seriously into the pursuit of it."

Qualities of professional development

Recent work on professional development points to a number of key characteristics, or qualities, associated with successful professional development. We outline briefly these major qualities.

Professional development about/with technology is not primarily a matter of technology but rather of *improving the profession*, aligning technology professional development with a school or school district's long-range vision of learning, school improvement, leadership, and accountability. More general attempts at providing profound professional development, for example the Professional Development Schools approach (PDSs), provide important insights into how technology can become part of this profession and such an approach underlines the importance of:

- partnership and collaboration: between schools and other organizations such as faculties of education;
- inclusiveness: of teachers in the design of their own development, and of all students in the expectation for improvement;
- inquiry: long-term reflection and research on practice;
- renewal: an openness to inventing new ways of doing.

The literature on the PDS offers relevant and profound visions for the improvement of the profession and for measuring progress towards such a vision. It also highlights the important collaboration between pre-service teacher preparation and in-service professional development across schools and schools of education. On-going Pan-Canadian research on Educating the Educators (http://tact.fse.ulaval.ca), the seventh theme of the TeleLearning Network of Centres of Excellence (TL•NCE) (http://www.telelearn.ca), is aligned in these directions.

Another characteristic of professional development is the relation to standards and norms, and the development of more precise expectations, with related accountability measures, for the integration of technology into teaching. There is a growing sense that "good" professional development can be related (not necessarily equated) with broad-based standards such as the ISTE Standards (http://www.iste.org/Resources/Projects/TechStandards/) or the NCATE Draft Standards for teacher preparation (http://www.ncate.org/projects/tech/TECH.HTM). To understand current professional development practices in Canada, it appears important to consider how these standards are being adopted, discussed, adapted or modified, how teachers participate

in such debates on standards, and what are the positive and possible negative aspects of developing and using standards?

These definitions orient our investigation into professional development models that are currently in application in Canada as schools and classrooms become networked. The integration of network computers is a catalyst for change. Therefore priority is being given to professional development models that address both individual and organizational growth. This means that learning about technology will be considered in the context of a fuller process leading toward whole-school change as it relates to teaching and learning practices. Following the suggestion by Sideris and Skau in their discussion of school restructuring, this report includes professional development activities devoted to 1) the development of a clear sense of purpose and a shared vision, 2) the building of a collaborative culture, 3) the learning of new leadership roles for the governance of schools, and 4) reflective practice and critical inquiry. Reflective inquiry will, at its best, be conducted in ways that deepen students' understanding of the key notions and principles emphasized in local curricula.

It is suggested that in order to move in the direction of horizon of such scope, the philosophy of the new professionalism that is required be "a synthetic relation between professional and institutional development". For Hargreaves (1994), "the driving force towards what has been called the post-technocratic model of teacher education", is this new approach to professionalism.

Professional development may take many forms and shapes. As it relates to teachers' learning about or with online technology, the review team translated the results of its literature search into a number of bi-polar choices available to educators who wish to offer or take professional development:

- With respect to **content**, professional development may be:
  - concentrated on removing teachers' anxiety toward computers, or
  - gateways to greater networking capacities.

- With respect to **process**, professional development may be:
  - a single or
  - a multi-faceted program (short courses & workshops offered after school, weekends, and during the summer);

  - broadcast on TV, available on videos, or
  - site-based, and hands-on;

- provided to all at once (teachers, aides, substitutes, administrators), or
- tailored to individual needs of teachers and other staff members;

- offered using a Train-the-trainer model, or
- a service-based model involving high school learners;

- fostered through incentives provided for obtaining personal computers at home, or
- valuing each participant that volunteers his or her time;

- conducted only face to face, or
- online;

- centered around an annual-event bringing teachers, administrators, provincial policy makers, and teacher educators together, or
- offered using a sequential model, that is, a model that "move developmentally and conceptually from basic to advanced levels of competency" (Taylor Northrup, & Little, 1996).

- With respect to **context**, professional development may be:

  - offered before the school, labs and/or classrooms are networked, or
  - applied by teachers immediately after their classrooms are networked;

  - just-in-time, as connectivity issues get resolved, or
  - just-in-case as more networked computers become available;

  - conducted in a solo mode, or
  - in partnership with other schools, or institutions, including universities.

While telecommunications and telematics have been in schools for quite some time (see the professional development activities previously offered by the Education Network of Ontario and the Réseau de télématique scolaire du Québec), the advent of the Web (World Wide Web) is a major milestone in Internet-based applications for teaching and learning. It means that teacher education about, and with the Internet is extended from information access to project work, including collaborative learning and teaching. Educators are faced with developing new technical knowledge and skills, and more complex pedagogical and managerial knowledge and skills.

To this end, the local and larger context must be supportive of the innovative teacher. The role of the school principal is especially important in this context, in addition to the role of the school board. Strategic relationships that schools establish with universities increase the

possibilities and opportunities for the school community as well as for the university capacity for renewal, therefore offering mutual benefits that characterize authentic partnerships. Finally, our analysis of professional development in/with technology needs to consider how a school or school district plans to continue making progress when the special funds for ICT will be phased out. Here again, Bereiter, professor at OISE/UT, points to a key direction in relation to educators' professional development:

> In modern professions such as dentistry and engineering, progress is taken for granted. But it does not just happen. These professions are organized and conducted in ways that make it happen. They were not always that way. Dentistry and engineering were once slowly evolving traditional crafts just as education is today. Clearly, scientific knowledge has been essential to their progress, but there is more to it than that. They have not merely been the beneficiaries of scientific advances. These and other modern professions have become knowledge building communities.
>
> Although some members of the communities specialize as creators of new knowledge, the profession as a whole is geared to knowledge advancement, depends on it, and has a part in it. In order for education to become a modern profession, it must begin to organize itself around the creation of knowledge.

It is important to realize, however, that the organization of some professions, such as medicine, into knowledge building communities is an ongoing process responding to periodic challenges of progress and growth, similar to the current situation in teaching.

Methodology

This review intends to provide the SNAB Working Group on Professional Development with an overview of the teacher professional development models (in-service models) in practice in Canada. In-service models that are excluded pertain to post-baccalaureate or graduate programs offered on university campuses (see Owston, 1999).

The models used illustrate the three modes of social interaction for professional development: 1) face to face interaction; 2) face to face and online interaction; 3) online interaction (human-computer interaction, and computer-supported social interaction). Given SchoolNet's mandate, models focusing on Web-based and other Internet applications were given priority. This denotes that training programs that primarily use other software for instructional

use, such as PowerPoint, were not given primary consideration, except in the case where they are being learned with the intent to publish on the Web.

Search procedures. The Review Team engaged in secondary research. School-based, school-district-based, multi-school-district-based, provincial/territorial, and Canada-wide initiatives and programs were investigated, including teacher associations initiatives. One process involved scanning documents/reports published in the last two years by a number of committees on the professional development of in-service educators, K-12/13, and which focused specifically on the integration of ICT into learning. Another source of information involved a nomination process in which members of the Committee were invited to contribute their advanced knowledge, in the form of suggestions of outstanding programs in their own province or elsewhere in Canada. The third process involved interview cross-referencing. Over 50 individuals across Canada were contacted, and interviews were conducted with more than twenty. Printed and online materials were reviewed before, after or instead of interviews in such ways as to find information that would describe the following elements: 1) sector of practice (primary, secondary, postsecondary); 2) participants involved (individual teachers, teams of teachers, whole-school project); 3) time schedule (synchronous or asynchronous learning activities); 4) content (vision, intranet, Internet, Web-based, student-Web interactions (information, communication, collaboration), add-on or curriculum-related activities such as informatics or second language); 5) process (locus of control, access to network computers, underlying theoretical model, learning methods, nature of support provided after and between sessions); 6) learning outcomes; 7) management (isolated program or ecosystemic initiative); 8) program outcomes (formal evaluation results, if any) ; 9) cost; and 10) success indicators and/or follow-up activities.

A template reflecting the above elements was built (see Appendix C). A copy of the template was completed for each of the identified programs, but proved to encompass an ineffective level of social desirability and thus not discriminative enough for the spectrum of prevailing models that the review team needed to focus upon.

Data was also generated through Internet information searches in order to complement data gathered with the exception of teacher association professional development initiatives posted to their web-sites.

Selection of models. The intent was to illustrate models that work. The review team members therefore relied on a number of individual reports and third-person professional judgments to point to projects occurring elsewhere. The review team members' major difficulty

within the context in which they were operating was that the expected outcomes of teacher professional development were not clearly defined and, therefore, that no strong evidence of success could be offered for the professional development initiatives and programs. Using the literature on professional development for teachers, the review team identified relatively "objective" measures of success (see Chapter 1). Other examples are: i) is there any evidence of improvement on specific measures of the quality of the professional activities of the educators involved in the XYZ initiatives or models; ii) is there evidence of knowledge growth in the teacher community; iii) is student-learning improving. The Holmes Group Report (1990), entitled *Tomorrow's Schools: Principles for the design of professional development schools*, identified six principles for designing professional development and professional development schools (PDSs), and the review team therefore suggests that many are valid for any professional development opportunities for teachers: 1) teach for understanding so that students learn for a lifetime; 2) organize the school and its classrooms as a community of learning; 3) hold these ambitious learning goals for everybody's children; 4) teach adults as well as children; 5) make reflection and inquiry a central feature of the school; and 6) invent a new organizational structure for the school. The review team did not intend to inquire in any substantial manner into such principles-in-action in order to select the most successful or promising models at this point in time. The review team thought useful, however, to bring to the Working Group members' attention, ways that might prove to be more promising than others in the long term, as they are presented with the empirical evidence that proves that a wide variety of teacher professional developments models have been launched by Canadian educators and their partners (Chapter 2).

The reader is to understand that a particular model was chosen for its relevance in illustrating an important element of the large spectrum of what is being initiated to respond to the teacher's professional development needs of a knowledge society.

Chapter 2

Models at Work

This chapter presents, as brief case studies, a spectrum of models, ranging from school-based models to models of a Pan-Canadian scope. Models that relate to local initiatives tend to be described in more vivid terms, and with more depth. District, Regional and broader models, such as those of teacher associations, that use the Web and annual conferences to educate and motivate their members, are described in a more general manner. Together, they provide an overview of Canadian models for teacher professional development in a knowledge society.

1. School-based models

Case 1.1

The Champion Model
Contact Person: Barbara Keating, Herbert Spencer Elementary School, New Westminster, BC

This school based, champion-driven professional development initiative in the integration of technology in learning and teaching emerged as an on-site M.A. program in educational technology for the teaching staff of a small elementary school. Also, other teachers in the New Westminster School District participated.

The leadership for this initiative came from the school's head teacher, who negotiated with the various parties so that the program could be shaped by the teacher participants and offered by a receptive university using the school's technology in 20 hour weekend sessions once per month for two years. Other electives were made available. The university academic calendar was adjusted to meet the teachers needs.

The program supported the vision that children and their differences can be challenged and engaged through the integration of technology in learning and teaching. All staff participants graduated and when the champion moved to a large elementary, the same concept was enthusiastically endorsed by half the staff of the large school plus other teachers in this small school district.

The program, using both face to face and online training, blended work and study, while using the school curricula and the teachers own innovative teaching strategies as the vehicles for their learning. University resources and collaborative work teams, that carried over into the school day, provided challenging and motivating support. The use of technology in learning and teaching in the school became a natural part of the daily educational process.

The program was integrated with the school certification process, resulting in a school action plan whose values, goals and activities were shared among the staff, thus confirming a direction for technology in a collaborative school culture.

The school based decision making model of the school district facilitated some funding for this unique training and enabled the allocation of school, community and district resources to support the school's professional development initiatives. Keeping up with the technical knowledge while making it part of a realistic, on-going, comprehensive plan was difficult but was facilitated once the vision that developed during the professional development program in technology was shared.

Indicators of success of various kinds and levels emerged. These technologically skilled teachers earned a graduate degree and were recognized as district resources. The vice-principal received the Marshall McLuhan Award for the use of technology in education. The program kick started the school's integration of technology in curriculum and instruction. School certification and a school plan that included technology was achieved. The model became an integral part of the district's professional development approach to improving the learning/teaching process. Students naturally use technology in their learning.

Case 1.2

The Teacher Leadership Model
Contact person: Diane Grieve, Clark Boulevard Public School, Peel District School Board, ON

The technology project at is another similar example. The project is a schoolwide initiative in all grades, with all teachers and staff, and is led by a technology team consisting of lead teachers in the school. The project not only promotes technology but inspires teacher leadership.

Clark began as one of the Hands on Information Technology schools and has advanced the project to the present feature of providing a course in 'integration of technology" for other school teams from elementary and secondary school. An extensive part of the school's project is the grassroot development of teacher experts throughout the school. Teachers in the school develop and deliver their own professional development for all teachers in the school in all technologies. The focus of the school's project is to integrate technology into curriculum where it can be used as an everyday tool. The professional development is teacher-led; all students from K-5 use technology each and every day; all technology skills of students are tracked as reading skills are tracked; a schoolwide database of technology skills is maintained at the school; the project is led by teachers and is a dynamic and evolving project. The project continues to be an evolving project with the intent to create a school without walls.

The project at the school has extended its private sector partnership to Nortel Networks who provide the school with "experienced" technology.

Case 1.3

The School-within-a-school Model
Contact person: Gilles Grégoire, École les Compagnons-de-Cartier, Ste-Foy, QC

A successful model is developing in Quebec where 5 teachers and 120 junior high school learners are teaching and learning with a laptop computer each. The program (PROTIC), which is oriented toward a proactive or professional approach to the integration of ICT into teaching and learning, will be in its third year in September 1999, and now include 7 teachers and 180 students. By 2001, the full secondary education program will be offered to 300 students, that is, to 20% of the whole student population of this large secondary school. Project-based learning is both the result of the year-one teachers that focused on this approach for up to 65% of class time, and the support of the school and the school district that made this approach workable.

Partners include parents – who pay for the laptops – and Laval University's pre-service teachers. The Department of Education as well as private partners also provide resources for professional development. Bi-monthly half-day meetings are for the collaboration action-research projects being conducted within the school. Cooperative learning, curriculum integration, and a learning community model are also part of the renewal that is undergoing. Relations with other teachers are adequate, though extra resources go to the school-within-a-school program. Bridges to other classrooms are being established, and learning projects conducted concurrently. Pre-service teachers work in both "schools", and used at times the same web-based discussion forums.

The school teachers have the full support from the school district and professional personnel contribute in a number of ways (e.g. math and computer specialist as well as project-based specialist). The school is the locus of experimentation for the whole school district as regards ICT. There are many unprecedented events that must be discussed, and analyzed. Reflection-in-action and on-action is a must. Student learning is most encouraging, with improved results in some subject matters.

Case 1.4

The Self-directed OnSite / OnLine Professional Development Model
Contact Person: Larry Danielson, Garden Valley Collegiate, MB

Garden Valley Collegiate is a Comprehensive High School (Grades 9 -12) with 900 students and 55 teachers in Winkler, MB. Approximately 300, primarily Grade 11 and 12, students take online or partially online courses. This puts a heavy onus on the teachers to be familiar with and skilled in the use of state-of-the-art information and communication technologies, in particular groupware. The Collegiate uses WebX as its present groupware of choice.

Professional Development at the Collegiate is not so much a program, project or plan as an on-going, somewhat ad hoc (in the sense of adaptive, rather than random) process encompassing all of the usual Professional Development ploys, formal and informal, and in particular mentoring in a buddy-system.

Teachers attend Conferences, as participants and presenters, take college and university courses and seminars, both online and in person. There is great emphasis on cross-disciplinary meetings and discussion, greatly facilitated by the use of groupware after school working hours.

Thus, teachers engage in Professional Development on school time, teacher time, in both synchronous and asynchronous modes, and both face to face and online.

The content includes basic skills as required, but for the most part involves learning the pedagogical and collaboration skills necessary to support the activities of the Collegiate.
Access to network computers is pervasive, both at home and at school.

Management of the process is in the hands of the teachers and is school-based, with emphasis on considering teachers' beliefs and perceptions.

There appears to be improvement in the school, according to the usual school improvement benchmarks, in particular a clear sense of purpose and shared vision, continuous training support provided in a variety of forms, team-building and teamwork. Reflective practice and critical inquiry increase as teachers engage in what is in essence action-research.

Perhaps the most significant sign of success is that the school has moved from pride in a self-image as a "Sports school" to an increasing pride in the status of "Technology" school. Students engage in real-life activities such as writing for SchoolNet News and the community Newspaper, have done alpha-testing of software for a local firm and, as precursor to re-vamping the School Web-site, have surveyed and critically analysed 500 Web-sites.

There is some evidence of "online" students achieving 10-15% better results on some provincially mandated examinations, which success students attribute to enhanced problem-solving skills.

Certainly, students engage in more information-rich and open-ended inquiry-type projects and feel better about what they are doing, while teachers talk about successes and missed opportunities, and engage in more substantive discourse among themselves, with learners and to a certain extent with parents.

Case 1.5

The Community-oriented Model
Contact Person: Nancy Desrosiers, Elm Street School, PEI

The Elm Street Elementary School administration, with its commitment to advancing the integration of technology into the curriculum and best practices of learning and teaching, works closely with its teachers, students, parents, school district leadership and the Department of Education to take advantages of the programs available in this small island community. In addition to being seen as a powerful teaching and learning tool and a vehicle for professional development,

technology is seen as a motivating force that works best when it is a natural part of the culture of the school.

Through the use of a school lab, internet access and locally connected classrooms, the vice-principal models the use of technology in her teaching and volunteer professional development sessions with the staff after school. Weekly staff meetings feature technology. School based ProD Days, such as the two days in February, 1999, are devoted the integration of technology in teaching.

By collaborating on such initiatives as field testing the Department of Education's policy guide in technology, by having the vice-principal as the district contact person for technology and a member of the school's ProD Committee, the school ensures that maximum use is made of existing programs.

Some of these programs in which Elm Street School has participated are the Department of Education's recent mentoring initiative, summer institutes in technology integration and a Community Access Project. Through active involvement in such initiatives, the school becomes aware of developments in technology and thus, can apply for available resources to further encourage staff professional development. Through participating in some of these programs, hardware can be purchased and computer technology is opened in a natural way to students, teachers and the community.

Also, by encouraging technology leaders on staff, by using older elementary students to assist those teachers less technologically comfortable and by opening the school's technology to the community, these relationships facilitate the development of a community of learners.

Case 1.6

The Small / Smart Steps Model
Contact Person: Shawn O'Donnell, École bilingue Notre Dame de Sion, Montreal, QC

École bilingue Notre Dame de Sion is a private bilingual Roman Catholic elementary school of less than 200 students with a multicultural and religiously diverse population. The staff, numbering 15, is very experienced and virtually all part-time (this latter to accommodate the need for both languages to be taught by teachers using their mother tongue).

At the beginning of the 1996-97 school-year, the Principal purchased 8 computers installed on a LAN in the small library and retained the services of an external consultant to introduce a few teachers to the technology. Among these teachers was a very experienced part-time woman teacher, recognized as a leader by the staff. She quickly became very interested in the technology and its pedagogical applications. By the end of the first year, she, with the strong but gentle support of the Principal, was urging her fellow teachers to become involved.

During the next schoolyear, this local champion became even more active, introducing her colleagues first to the use of the computer for minor classroom management tasks and then slowly

moving into more pedagogical uses.

Now, in the third year, the Principal, while maintaining the library/lab, has purchased sufficient computers to install one in each classroom, soon to be networked, while retaining external consultants to offer both a broader vision and classroom practicalities as support for the continuing efforts of the champion.

In the first year, funding for the external consultant came from re-allocated school funds. In subsequent years, these services and honoraria for the champion came from Professional Development Grants applied for and received from the Provincial Government.

Most of the time devoted to teacher professional development is teacher time and individual.

The content of the Professional Development has moved from learning about technology to curriculum-related activities in both languages and covering most elementary school subjects.

The school's methodologies have been relatively traditional, but are moving quickly toward a more integrated curricula and project-based learning.

This is a local plan, supported by provincial funding, and was initiated by the Principal but very quickly became teacher-driven, with parental support.

The emphasis has been on role modelling, with teachers' beliefs and perceptions considered, along with a significant amount of teamwork in the context of a collaborative culture.

Formal evaluation has not been completed, but teachers are clearly very happy with the progress they have made. They are beginning to use the technology regularly, particularly to initiate student-centered activities, with more teachers being receptive to adopting technology in their classrooms.

A subset of school-based models is activity-oriented models, ones that focus on the energies and collaboration of a number of teachers and their partners, from one or more schools, on a shared object to construct, and develop:

Case 1.7

The Web-site as a Shared Task Model
Contact person: Mary Norton, École La Courvilloise, Beauport, QC

Knowing that their English-as-a-second-language lab could become obsolete without ICT, a team of teachers at the school decided that they would learn to integrate technology into their teaching. With the help of a lead teacher that had begun to develop a web-site to support her own teaching,

three other teachers and the assistant principal submitted a project to their local university as an associated school for pre-service education as part of this small scale project.

The renewal of the English lab had to be extended over a two-year period. Meanwhile, the team put together a professional development plan that included technology skills as well as pedagogical skills (cooperative learning, project-based learning, and integrated curricula). The lead teacher retired last year, and chose to continue updating the web-site.

Access to network computers is through one of the two school labs, and the teachers are experimenting with two groups of students each a number of learning activities that they themselves planned with the help of a graduate student in developing a web-site to support the learning of a foreign language (Portuguese). Their plan is to integrate the learning activities found relevant in their regular teaching as early as next year.

Case 1.8

The Cross-Curricular Multimedia Instructional Unit Model
Contact Person: Larry Budzinski, Representative for the North West Consortium of the Manitoba Council on Learning Technology (COLT), MN

This project is one of many examples of Professional Development offered by the regional consortia of COLT, in this case, by the North West Consortium.

This project involved 9 teachers from 6 schools in one district. The teachers chose to be involved and all who chose were accepted for the program, which involved a 3-day summer session and another 6 half-days during the school-year.

The aim of the project was to produce a cross-curricular (ELA, Mathematics, Science, Social Studies) Multimedia Instructional Unit for Grade 6 classes. These Units had as their aim that students produce an invention or innovation.

The content of the project emphasised the pedagogy of the various curricula involved, treating the pedagogy of the technology very much as a tool for the former, and moving quickly to the use of such tools as the scanner and the digital camera and the building of WebPages.

The concepts of each of integrated curricula, project-based learning and cooperative learning are integrated into the program and encouraged, with a further emphasis on performance assessment in that the students are expected to produce an invention.

In the Professional Development setting, participants had free access to computers, while most Grade 6 classrooms are equipped with pods of 4 - 6 computers, and teachers in general have their own computers at home.

The project is an ecosystemic initiative, shared by administration and teachers, partially in the form

of a Computer Catalyst Group. The locus of control lies with school district involved.

Teachers involved are expected to be leaders, modelling behaviours in what is considered to be a Pilot Project.

There appears to be improvement in the schools involved, according to the usual school improvement benchmarks, in particular a clear sense of purpose and shared vision, continuous training support provided in a variety of forms, team-building and teamwork. Reflective practice and critical inquiry increase as teachers engage in what is in essence action-research.

The program is supported by both new and reallocated funds.

While participation in the program is high and teacher satisfaction apparently also very high, formal evaluation of the program is yet to come.

All of the usual indicators of success appear to be satisfied, although there is not yet evidence of better academic results on the part of students.

Case 1.9

The Mentor Model
Contacted person : Jacinthe Robichaud, Service de soutien informatique, Min. de l'éducation, NB

This is an example of teachers mentoring other teachers in integrating ICT in teaching and learning. This mode of professional development is based on person-to-person relationships, and mentors go to the classroom of interested teachers that have at least one computer in it. Most teachers also have access to a computer at home.

The mentor has successfully integrated ICT in his or her classroom in the past. He or she is physically there, at times, with the teacher in his or her classroom, getting to know his or her teaching style, and developing relevant learning strategies. There is a total of sixteen (16) mentors in the francophone schools of New Brunswick. For each of the three schools associated with the research side of this project, the mentor is each school is full-time (Cité de l'Amitié, Centre d'apprentissage du Haut-Madawaska et L.-J.-Robichaud).

Professional development with the mentors also includes weekly after-class meetings. Topics vary according to interests and needs of the teachers (software, cooperative learning, project-based learning). With the help of the mentors, teachers develop learning activities to be implemented in each of their classrooms. Teachers may join mentors on the phone, or by email at all times.

Participating schools have identified clear objectives in relation with ICT and the local community is invited to share the vision. Industry Canada has helped to fund the project. Teachers find this model most interesting, and effective. Their level of confidence raises, and so their interest in integrating ICT in their classrooms. They relate this professional development to their effectivess

as teachers.

Case 1.10

The "Computers for Lunch" Model

Contact persons: Suzanne de Castell & Al Maxwell, BC

What every B.C. teacher needs to know about computer literacy, is made easily digestible, byte-size servings in this web-based self-instructional computer-literacy course for teachers and would-be teachers is designed in 20 minute units spanning 24 short sessions, and covers all the essential elements prescribed in the BC IRP for technology education. Teachers are able to complete the course individually or collaboratively, in 20 minute lunch-hour sessions, with enough time left over for lunch, and even a break and a chat with colleagues!

Modelled in small groups first, then groups of teachers knock off online lessons prepackaged by graduate students in the UBC program. They do this in collaborative groups at lunch or a convenient time of their choosing, in the school. Teachers have mentors, but it is mostly self correcting work on all the elements for an understanding of ITC.

This initiative is designed to eliminate or minimize the impediments to teacher professional development teachers, both on-campus in our existing teacher-education programs, and in-service on the school site, through the creation of a web-based "computer-literacy" program. information technologies.

Materials and resources for instruction are made available to teachers for "downloading" (which just means copying from the Internet web site to the computer they are working on, and able to be printed out from the school printer for immediate classroom use). Instructions are provided for how to "download" any instructional materials teachers want to use with their classes. Ongoingly updated LINKS to useful web sites, particularly those which "enrich" the basics of the program with additional teaching resources or which provide instruction in more advanced skills and applications, as well as those which provide lesson plans and sample projects, completes the "Computers for Lunch" self-instructional program.

"Computers for Lunch" is designed to bridge the gap between concepts (such as Multi-Media), and actual applications (such as HyperStudio). Often the only resources available provide either general descriptive information about 'What is multi-media', or completely application-specific instruction such as 'How to use MS Word'. "Computers for Lunch" seeks to help students learn how to use multi-media tools in general (animations, video, ..etc) or word processing in general (how to change fonts, spell-checking), rather than the purely procedural knowledge useful only for a specific application-- and indeed sometimes only for that version of it.

The program seeks to empower teachers to approach a new application and have a sense – both conceptual and practical – of how they might use it. The idea, in essence, is this: don't teach people what a program expects from them, teach them what to expect from the software. Then they can sit down in front of almost anything and have a sense of how it should work.

"Computers for Lunch" can be, in effect, a more gentle interface for teachers and students between ideas about technology and the technology itself.

Another subset is at the post-secondary level, and herein below is the example of what one college has engaged in order to create conditions of professional development for Faculty:

Case 1.11

The College-wide Model for Professional Development of Faculty
Contact person: Katharine Janzen, Seneca College, ON

This college has promoted the use of instructional technology and the development of exemplary post-secondary learnware through a broad series of initiatives designed to lead staff through three phases of cognitive development.

In the Awareness phase, Faculty have been exposed to the potential of instructional technology through demonstrations, seminars, online conferencing and hands-on exposure to hardware, software and online resources. The emphasis has been on peer presentations, "faculty show and tell", to increase buy-in, reduce technophobia and alleviate fears of redundancy. These efforts, coupled with the intense media coverage of new technology have ensured that most staff are aware of the increasing role that interactive, instructional technology can play in education.

Awareness, of course, does not denote acceptance, but approximately 10% of faculty has become early adopters eager to incorporate aspects of technology into their programs and to continue to develop their skills and knowledge in the use of learning technology.

In the Training phase, several approaches have been taken to training professors in new media development, recognizing the steepness of the learning curve in acquiring the knowledge and skills necessary for multimedia development.

The first approach has been to recognize that the professor is most appropriately designated as a content expert who needs to be supported by a team of technical, creative and instructional design specialists. This has been most appropriate when the project being undertaken is complex and sophisticated.

The second approach has assumed that the material being designed is adjunctive and more presentation than interactive multimedia. In this latter case, success has been achieved by targeted training in software and hardware appropriate to the scope of the project.

Both approaches have relied on a resource base of hardware, software and ongoing support. By providing both types of training as well as supporting attendance at conferences and seminars, Seneca College has developed a base of well-trained, competent new media developers.

In the Implementation phase and with respect to the objectives above, several major initiatives are already underway. The college has established an Academic Innovation Fund to which faculty can apply for funding of innovative educational technology-based curriculum projects of any size or complexity. The College has also established a Centre for New Technologies in Teaching and Learning (CNTTL), staffed by a highly qualified technical person in the position of Manager, one faculty member who is responsible for project management and a team of students from computer studies programs who work under the government sponsored Student Work Study program (80% of wages paid are reimbursed to the college). These student provide the technical support to convert the faculty's designs into online or other multi-media format. In addition, faculty may drop into the CNTTL anytime to obtain ongoing, just in time and as requested assistance in developing any technology based curriculum materials of courses.

The Centre for Professional Development (CPD) offers a program and provides consulting services. The former is a 5 subject certificate program, Designing Curriculum Using Instructional Technology (http://ilearn.senecac.on.ca/cpd) that teaches educators at any level of the educational system to integrate technology into learning outcomes driven curricula. Offered entirely online over the Internet the program is based on experiential learning principles, and collaborative learning. It is highly interactive through asynchronous and synchronous group discussions. The program has won two *Excellence in Innovation* Awards already!

2. District, Group of Schools, and Partner-driven Models

Case category #2, District models, seem to be characterized by the following Cascade model (teacher representing school and assumed to teach their colleagues back at school); peer coaching and "just in time learning"; networks of contact persons. There seems to be a progression from a simple cascade model (without much local structures to support the peer coaching) to a structured network approach (in which a system is put in place, through a variety of mechanisms, so that peer coaching happens at a deeper level).

Case 2.1

The Inclusive Partnership Model
Contact Person: Linda Saunders, O'Connell Elementary School, NS

With the involvement of the principal, this new school was conceived and built by a consortium consisting of business, the Department of Education and the Halifax Regional School Board and then leased to the school district. O'Connell was envisioned as a site of best practice, which would integrate technology and other innovative practices in teaching and learning. The staff was

selected with this vision as part of the criteria, on the understanding that for two to three weeks before school opened in 1997 all twenty-five teachers would participate in an in-service program on the application of technology in learning and teaching.

Because of the staff interest but differences in experience, the professional development program was presented as a smorgasbord for "gourmet omnivores", with teachers selecting technology topics of interest. From this approach emerged small teams of teachers, who become trainers for other teachers. Also, it was understood that there would be on-going staff development in technology, such as after school training, the use of the four professional days and the release days allocated to the school by the school board. Many staff members were involved in related university courses.

The integration of technology in learning and teaching was facilitated by every teacher having a lap top, every class with at least three computers and a fully equipped school lab (without a lab teacher) into which regular classes and their teachers were scheduled. Also, the lab was heavily used by students and teachers during unscheduled time.

Much of the training in technology used the curriculum and innovative instructional strategies, such as cooperative learning and multi age/multilevel teaching, as the content through which the technology was learned. More creativity was used in scheduling classes to facilitate the integration of technology in learning and teaching. This technology training included support staff and involved parents, thus embedding technology into the culture of the school.

Although no formal comprehensive evaluation results are available in this new school to assess the program, visitors to the school are impressed with the children's positive response to learning with technology, their facility with technology in obtaining information from a wide variety of sources in addition to the teacher and their ability to use technology to express their learning. Another indicator is the success that O'Connell students are experiencing at junior high school.

The principal now has district responsibilities for the integration of technology in several new schools that are being built by the consortium. At this early stage, it was suggested that perhaps the best indicator is the enthusiasm and extensive integration of technology in learning and teaching that permeates the practice of students and teachers at O'Connell Elementary School.

Case 2.2

The Learning Partnership Model
Contact person: Peter Butler, ON

The Learning Partnership - Hands on Information Technology is a private-public sector partnership, featuring 13 major corporations and 16 School Districts. In the project 16 elementary schools are participating in a 3 year project to develop the technology skills of teachers in the effort to integrate technology as a daily tool in the classroom. Over the 3 year period, all teachers in the 16 schools have participated in professional development in the 3 main categories of /face to face and online/ and online interaction.

The project has involved all teachers in learning the basic skills in advanced technologies to the learning environment and personal professional development. A major component of the project is a comprehensive evaluation of all schools in the project including qualitative and quantitative evidence of success. School Districts and corporations have joined in the financial commitment to the project.

This is one of the most extensive private-public sector partnerships in bringing technology to the regular classroom in Ontario. The key feature is the focus on the development of teacher skills firstly, provision of hardware, integration to curriculum and connectivity to other teachers for continued professional development. Additionally, the project's major goals in the development of collaborative cultures in schools.

Case 2.3

The Collaborative Action-research Model
Contact Person: Pat Redhead, Edmonton Public School Board, AB

Project Pegasus is a professional development project for teachers based upon action research. The essence of the project is to offer teachers the time and opportunity to try new things, to reflect upon their experiences and learn from others, thus realizing how technology can improve student learning and achievement and becoming, with technology, capable of much more.

The project is aimed at primary and secondary school teachers, who attend as representatives of their staffs and are expected to act as leaders upon return to school. The formal part of the project unfolds over a day and a half of paid time and involves both synchronous learning activities, during this time, and asynchronous activities via later contact through email and the Pegasus Web-Site.

For the most part, basic technology skills and even most techno-pedagogical skills are assumed, with emphasis placed on learning and teaching with technology and research about sound uses of technology in the classroom.

Given the pedagogical thrust of the project, other forms of innovative teaching such as integrated curricula, project-based learning and cooperative learning are woven into the fabric of the project.

Teachers have free access to computers in the Professional Development setting, while most have computers at home with no district-mandated incentive program. Various arrays of computers are to be found in the schools.

The project was very much a system initiative initiated by the District Administration and is a District Program, but, in practice, is very sensitive to teachers' beliefs and perceptions.

The Project incorporates clearly-stated goals and expected outcomes and a considerable degree of role modelling. It encourages a shared vision and new leadership roles in the schools setting.

Given that the essence of the project is action-research, reflective practice and critical inquiry follows easily and teachers begin to share their knowledge about how their work fits into educational theory.

The cost of the program is borne by reallocated funds, with no reliance on external funding.

While the program is so new as to preclude formal evaluation results, teacher satisfaction appears to be very high and there is evidence that teachers subsequently use the technologies increasingly.

It also appears that teaching approaches become more constructivist, with more student-centered inquiry-type learning projects resulting in the student production of genuine artifacts.

Case 2.4

The Cooperative Model
Contact person: Colette Deaudelin, Trois-Rivières, QC

Since 1996, this university-school project connects schools (6 to 8) from rural areas to the Université du Québec à Trois-Rivières. School boards provided funding for professional development, and equipment to the schools. Some local communities also got involved, and offered computers to schools or free Internet access. The research project, funded through FCAR, first provided teachers with technical training (word processing, email, introduction to Internet), as well as training in cooperative learning. Professional development now includes face to face meetings with other teachers handling the same difficulties, and individual help to the teachers to effectively integrate technology in their classrooms. Support is also extended through electronic mail. Schools are now much better equipped, and new laboratories are being used constantly. Furthermore, in general, teachers interested have a computer in their classrooms to facilitate use on a daily basis. Within a school, participating teachers learn with, and support one another. In some cases, the whole teaching staff benefits from training sessions and support is offered in many forms.

Contact person: Gilbert Paquette, Montréal, QC

Since 1995, another cooperative project, entitled Clés-en-main, connects two schools, the Department of Education, Télé-Université, and many private companies interested in the integration of ICT in teaching and learning. The different partners in the project worked co-operatively to develop a most thorough technology plan to support the integration of ICT in the two schools. This initiative reflects the important contribution of external resources to the development of a technology plan, and of a systemic approach to ICT integration to teaching, learning, and management. High-level funding was invested in this research-action project. Findings included profound changes in school management, process, and politics that accompanied the use of technology tools for different usual school tasks. The two school models are now used

as reference materials to other schools that are currently defining and/or implementing their own technology plan.

Case 2.5

The Entrepreneurial, High Tech Model
Contact Person: Maureen Smiley, Rock Ridge School, BC

Although no company logos adorn this new school to advertise it, from the entrepreneurialism emanating from the supportive school district, to the business partnerships that equipped this high tech school of nearly 700 students, to the school leadership who asks of their teaching, "what knowledge and skills do we want our kids to have when they leave our school?", to the students' own initiatives in technology, an entrepreneurial spirit permeates the system.

A partnership provided a ratio of three students to one computer in a school with three fully equipped labs, a resource centre of computer equipped pods, computers in every classroom and a computer for each of its 35 teachers.

As with most change, not everything worked as planned. Although the 1996 school opening saw the district provide training for the teachers who had been transferred to Rock Ridge, it was not as effective as hoped.

In the first year, this well equipped school had to spend time in getting the technology up and running smoothly while, at the same time, the teachers were preoccupied with getting to know their students, parents and each other in this new setting.

Later, when respected in-school practicing teachers with technology application backgrounds were used as coaches and when district personnel were used to help teachers with identified technology needs, coaching and "just in time learning" rather than large group presentations emerged as the most suitable professional development in the integration of technology in learning and teaching in this school.

Through a supportive district infrastructure, and school/district entrepreneurial partnerships with business, coaching teams of teachers on the integration of technology in curriculum and innovative teaching practices became the most successful professional development model. Networks of teacher teams began to meet regularly to examine best practices and support each other in the use of technology. Departments and groups of teachers meet after school or are released from teaching to explore with an experienced colleague some technology that they find pertinent to their teaching. Naturally, professional days are used for application training, often taught by a peer or a trainer for some identified need. Also, the district has offered a free week long program in August for teachers, who may sign up for specific application training.

Often teachers and students are coached together as members of the learning community. An example of this pervasive entrepreneurial spirit occurred when students, who had outgrown the broadcasting club they started that served school communications, proposed the introduction of a communications course that the school and school district approved as a popular elective in the school program.

At Rock Ridge, site based management and an entrepreneurial spirit enables in-school and partner resources to be directed towards additional staff development, as long as each initiative serves the school's vision and goals for the use of technology as an educational tool.

Case 2.6

The Teacher Center Model
Montréal, QC

The Centre des enseignants et enseignantes (CEE) affiliated with the Montreal School Board has teacher professional development as its mission. It offers a variety of training sessions directed to promote the integration of ICT in teacher practice. For example: technical training with word processing or the Internet, and pedagogical training on project-based learning, cooperative learning and skill development, and teaching strategies to integrate computers in the classroom.

These training sessions take many forms. Some are offered during several days distributed over the year, others are held after school hours, and others still are held during lunch conferences. Also, the CEE has developed networks of "répondants" (contact persons) in schools to further improve liaison with school teachers, and help create or expand teacher networks. The success of these networks is linked to the diminishment of professional isolation, by offering teachers the opportunity to share their knowledge and experiences.

Case 2.7

The Curriculum-centered Model
Contact Person: Lois Tobin, of Contact North, ON

The Wired for Learning Project is a successor to *Harnessing the Power of the Internet,* which was an on-going Project of Professional Development of Teachers which focused on the integration of technology into the curriculum. Both were offered by Contact North, a not-for-profit Distance Education Network funded by the Ontario Ministry of Education and Training and serving a very large region of Northern Ontario.

Wired for Learning is an on-going Professional Development Program focusing on the integration of technology into the curriculum. During a given year, approximately 60 teachers engage in face to face sessions, while another 40 access the materials online.

For the face to face sessions, teachers are clustered by subject areas according to a profile they complete upon registration. They devote 2 days and long evenings to the program, which for the most part assumes basic technology skills and quickly move into Best Practices, including mention of Acceptable Use Policies and Internet hazards. The program emphasises modelling of Best Practices, usually through the use of video-conferencing, and assumes/supports other forms of innovative teaching, such as Integrated Curricula, Project-based Learning and Cooperative Learning. Time permitting, teachers are encouraged to develop school web sites.

The management of the program is a mixture of ecosystemic, on the part of Contact North, and isolated plans, on the part of the school boards involved. The source of the initiative is both administration(s) and teachers. Contact North is very much a community-based organisation, which maintains control over the organisation.

The program is supported by both new and reallocated funds.

While participation in the program is high and teacher satisfaction, according to a questionnaire, also high, formal evaluation of the program is yet to come.

Further, Contact North personnel are not in a position to judge whether or not the individual schools undergo real school improvement as measured by the usual benchmarks, nor can they comment on the usual Indicators of success

Case 2.8

The Three-dimensional Model
Contact person: Ann Jones, Southwest Regional School Board, NS

There are three components to IT professional development in this model: (a) self-directed professional development (teachers' centres, focussed study groups lead by leadership team members, school-based study groups, school-based action research, after-school workshops and programs, consultation with district curriculum staff, distance learning options (web-based), and resource based learning (videos, journals, texts, audio)); (b) Board and Department of Education. Sponsored professional development (in school mentoring and coaching, school and district in-service sessions, summer institutes, out of district conferences, staff members on provincial curriculum leadership teams, after-school workshops and programs, teachers' centres planned programming, consultation with district curriculum staff, curriculum staff led professional development opportunities, Department of Education sponsored and lead professional development), and (c) Board Partnerships (partnerships for professional development activities/speakers, University graduate level action research program, University MEd programs of study, long term in service relationships with University, Faculty, Summer institutes, Distance learning, after hours, partnerships for construction of new schools).

All aspects of this model are perceived as important due to the fact that the board covers a large geographic area, with few major population centres. It is mainly rural and costal. They have few

resources and depend on Federal programs to contribute funds. They currently have a provincial/federal partnership for ICT and are building schools in public/private partnerships (P3) which include "infusion" of technology. Their Teachers' Centres are in Yarmouth and Bridgewater so that most teachers can get to one of the two centres within an hour drive.

Case 2.9

The STEM~Net Model
Contact "virtual person": http://calvin.stemnet.nf.ca
The real person behind it is Harvey Weir!

STEM-Net, founded in Spring of 1993, is the acronym for "Student/Teacher Educational Multimedia Network" Labrador – depicting the STEM logo of a boat ploughing through the water, leading the way. This computer network supports the teaching, learning and curriculum activities of K-12 educators and students in Newfoundland and Labrador. It works with partners in the public and private sectors to develop online curriculum-relevant program and content and to achieve regionally equitable access for schools, including school local area network links to SchoolNet and the Internet.

From the beginning, STEM~Net has provided electronic mail, newsgroup, library and Internet services. In addition. STEM~Net provides a graphical interface option for users and supports the development many curriculum-based activities. These activities are as wide-ranging as the imaginations of the teachers and resource people involved, and include, for instance, "Ask an Expert" and class-based networking projects. Objectives include 1) improving communications among K-12, public-college and university educators, 2) facilitating access for K-12 and public-college educators to a wide range of online resources, 3) fostering a better understanding among K-12 educators and their students of appropriate uses of information technology, and 4) supporting the efforts of educational and network research groups to provide a sound knowledge base for developments in educational networking.

The STELLAR Schools is a joint initiative of Cable Atlantic and STEM~Net that provides educators and students with 4 Mbps connections to various information networks, thus enabling class-based projects with video, sound, graphics and text in a full multimedia networking environment.

Case 2.10

The Remote-coordinator / mentor Model
Contact Person: Ron Bradley, Argyll Home Education Services Centre, AB

The Argyll Home Education Services Centre is a dedicated resource facility for all home-based

learning families registered with Edmonton Public Schools. It offers a variety of courses for K-12 students who wish to receive their education outside of the traditional restrictions of time and space.

The Centre operates as a school, offering student programs, and as a district-wide Home Education Service. Among the programs which the Centre offers is LearnNet, which is both a stand-alone online alternative program, in which students use computer technology for all of their curriculum, and also a component of the Learning Partnership, which supports parents in their choice of Home Schooling.

Since the learning needs at Argyll are unique, it must hire teachers who are particularly interested in students and their learning. However, these teachers must become technologically savvy very quickly. Further, their knowledge and skills must be constantly up-dated.

This project deals with the integration of 12 new teachers of varying degrees of technological sophistication into the total staff of about 42 teachers during the 1998-99 school-year.

Since the Professional Development is very much individual and self-directed, teachers manage it and it is strictly a school-based program, with, however, clearly-stated goals and expected outcomes and a great degree of role modelling. Given that it is internal to the staff, it is usually face to face, continuous and takes a variety of forms, and occurs approximately half on school time and half on teacher time. Teachers are encouraged to have or bring a computer at home.

The content touches on basic Internet skills, and the use of the Internet for both information and communication, but quickly moves into the pedagogical skills necessary to integrate the technology into all subject areas, particularly with the use of Lotus Notes. It is in the nature of the school that administrators, teachers, parents and students work together, both online and off.

Computers are pervasive throughout the school, in labs, in classrooms and also in conference rooms.

The nature of the school encourages teacher leadership roles in determining school directions in a collaborative fashion.

Since so much in the school is new and innovative, much of the teachers' work is action-research; survival militates toward the sharing of knowledge, experiences and research.

While no formal evaluation results exist, teachers satisfaction with this self-directed mentoring approach to Professional Development appears to be high, though some frustration is evidenced by the fact that neither the learning nor the urgency ever ends.

Case 2.11

The CEMIS Model

Contact person: Réjean Payette, GRICS, QC

As a way to implement its ICT Plan, the Department of Education has established a partnership with the Société de gestion du réseau informatique des commissions scolaires, and partly fund the operation costs of the Centres d'enrichissement en micro-informatique scolaire (CEMIS). There are provincial and regional CEMIS (http://www.grics.qc.ca/cemis). Teachers that understand IT and ways to integrate them into schools and classrooms provide help to teachers interested in using ICT in teaching and learning.

At the regional level, the CEMIS are quite active in the development of ICT plans, whether at the district or at the school level (e.g., Direction régionale Québec-Chaudières-Appalaches, commissions scolaires de Ste-Hyacinthe, des Mille-Iles, and others).

CEMIS are part of all events related to ICT integration in educational settings in Quebec. The socio-technical infrastructure that they provide is considered essential to the advancement of the effective use of new technologies in the classroom. At the local level, the teachers working in the CEMIS work with teachers in schools and, at times, in classrooms. They provide vision, day-time and after-school workshops, and are instrumental in the development of online resources (e.g. the SAQCA web-site at http://rtsq.grics.qc.ca/saqca).

3. Provincial and Canada-wide Programs/Initiatives

Case 3.1

The Cascade Model
Contact person: John Hogarth, AB

The TELUS Learning Connection (TLC) meets all of the following criteria:

(A) Activities are devoted to:
  1) the development of a clear sense of purpose and a shared vision,
  2) the building of a collaborative culture,
  3) reflective practice and critical inquiry.

(A) TLC utilizes all three of the defined ProD model categories:
  1) face to face interaction,
  2) face to face and online interaction,
  3) online interaction.

(A) TLC is dedicated to "stretching from information access to project work, including collaborative learning and teaching, that is rooted in improving the quality of learning situations".

The TELUS Learning Connection is in its second year of operation. Using a "cascading" model for professional development, 240 Teacher Leaders, from every jurisdiction in the province, have been intensively in-service trained by a five member provincial team (the provincial team is

comprised of teachers selected as a result of demonstrated leadership; they are seconded full time from their school district).

This in-service training has combined face to face meetings with ongoing online collaboration. An estimated 7000 Alberta teachers have received in-service training, in turn, from the 240 Teacher Leaders. This is also completed face to face and online.

One of the keys to the success of this initiative is the provision of 18 days of time provided to teacher leaders; another is the large scale support from jurisdictions to provide time for teachers to receive training in their district, and for Teacher leaders to travel to in-service sessions; another key factor is the high quality of resources and interaction opportunities on TLC's web site, www.2learn.ca, (1.75 million hits in November 1998 with visit duration averaging more than 17 minutes).

TLC is funded and governed by an alliance of key partners: Alberta Education, the Alberta Teachers' Association, the Alberta School Boards Association, The College of Alberta School Superintendents, and TELUS Bright Futures Foundation.

The budget for the first two years of operation is $2,000,000 with considerable in-kind donations in addition. The injection of significant funding from the IC GrassRoots program has promoted teacher participation and enhanced the collaborative nature of this professional development model. Many participants are stretching away from simply accessing and using information via telecommunications, to high involvement in project oriented activities that are often constructivist in nature, highly collaborative regardless of geographical location, and which align with the notions associated with action research.

New planning is underway in an effort to expand TLC operation to provide these kinds of opportunities to all 30, 000+ teachers in the province of Alberta. It is worth noting that TLC, and other Alberta professional development and technology integration initiatives, are supported by a provincial mandate, as well as jurisdiction and school leadership/emphases in most school district.

In addition, other important components exist or are under intensive review, in relation to successful technology integration in schools: a provincial program of studies for ICT, review and response to needs for technical support, usable connectivity, security issues, freedom of information/protection of privacy issues, and others.

The most effective way to investigate and understand the TELUS Learning Connection is to visit the site, online.

Case 3.2

Teacher Design Model
Contact Persons: John Hogarth (Context)
Pat Clifford and Sharon Freisen of the Galileo Centre, AB

Teaching and Learning with Technology (TLT) is both a document and a series of institutes developed and delivered by the Alberta Regional Professional Development Consortia. The 160 teachers and administrators involved identified four major goals for teachers:

- to understand the role of technology in Teaching and Learning,
- to use and create learning activities when students use technology,
- to know how to use technology to support teaching and learning and;
- to contribute to professional knowledge about use of technology in education.

TLT is a three-part program:

- Skill-building:operational skills, including file management, word processing, CD-ROM resources, the Internet, spreadsheets, databases, multimedia production, and other specialized applications;
- Technology across the Curriculum: creation of classroom strategies and projects for use with students, and resultant learning to use technology effectively and critically across the curriculum;
- Technology Leadership and Mentorship Creation of plans and projects to use while mentoring.

In particular, the TLT Institutes aim to prepare Lead Teachers to participate in building Units of Integrated Practice (UIP's), and then to work with two or three teachers at school to develop additional UIP's. Model UIPs are published on the UIP Web Site (http://tlt.edmonton.ab.ca/). Approximately 960 teachers and administrators have participated in an Institute and are each now mentoring two or three other teachers. These Institutes, with their multiplying mentor effect will continue.

Teachers attending the Technology Institute have identified the following significant effects:

- the use of technology increased among themselves as well as their students
- teachers organized their classrooms differently through a project approach
- teachers took on leadership roles within their schools
- changes in their teaching strategies and technology use led to greater student motivation and engagement
- principal asked for assistance in making technology-related decisions
- teachers enjoyed the mentorship of their peers.

An example of these Institutes is that offered on behalf of the Calgary Regional Consortium at the Galileo Centre, a professional development site located at the newly constructed Banded Peak School in Bragg Creek, and committed to improving student learning through innovative teacher practices, classroom-based research and the effective use of technology.

The project involved 30 primary and secondary school teachers and others from 18 schools in 6 district during a 3-day residential summer workshop, followed by a one-day follow-up session during the school-year.

The project dealt with the basic technology skills in an integrated manner, moving quickly toward an emphasis on the pedagogical and collaboration skills required to immerse the technology in the

curriculum, all within the context of, and reinforcing of good practices in innovative teaching, in particular, Integrated Curricula, Project-based Learning and Cooperative learning.

The heart of the project is the completion of a template for planning an integrated project for students (UIP), in which teachers engage in activities similar to those which will be required of the students, leading to and incorporating the reflective practice and critical inquiry necessary to action-research.

Teachers have free access to network computers in the Professional Development setting, while access at school varies. Currently, an incentive program for teacher to have home computers does not exist.

There are clearly-stated goals and expected outcomes and considerable role modelling, while teachers are exposed to both traditional and new applications of technology .

Support to participants is provided between and after the professional development activities in both face to face and online modes.

Funding of this project has been generated from both new and reallocated funds.

Participation in the program is high and based on formal evaluation teacher satisfaction is also very high.

Given the predominantly residential nature of the project, in-school indicators of success cannot be assessed, although it is anticipated that the teachers' interest in technology, constructivism, student-centered activities and the evidence of more substantive discourse among teachers will carry through into their schools.

Case 3.3

The Department of Education as an Integration-catalyst Model
Contact Person: Guy Albert, Department of Education, PEI

In a small island community, whose total number of students schooled in three district (two of which have 98% of the students) are fewer than the number of students in many individual school districts in Canada, the challenge of integrating technology into the learning/teaching process takes on different dimensions. The department of Education has paid for most initial hardware and wiring in the schools. All schools are connected to the Internet.

Given the lack of district resources/consultants, the Department, with valued input from school and district leadership, has carried out most of the initial training of teachers in the integration of technology in the curriculum. In recent years, to support their initiatives and those of leaders in the schools, the Department of Education has developed many projects in educational technology.

A two day Internet training program has released five teacher representatives from each school on the island from their teaching responsibilities, with the understanding that these teachers will provide similar training to other teachers when they return to their schools. By agreement with the teachers union, every new curriculum initiative requires two days of in-service training for teachers and part of that program addresses the use of educational technology.

The Department has offered free summer institutes for teachers to help them integrate technology into their teaching. Most recently as part of a labour market development program, the Department has hired and trained 50 unemployed teachers to go into the schools from February to June as technology mentors to practicing teachers. Other initiatives, such as the Islands Project, have motivated teachers and students from PEI, Newfoundland and Iceland to learn from each other through technology.

In addition to the Minister's Advisory Committee on Technology in Education, which receives input from districts, teachers, principals and parents in this island community, the close relationships that have developed over the years enable the Department to have many other meaningful interactions with educators in school districts and schools.

Through partnerships with business, several schools act as pilots sites for software in education. Also, teachers and the University of PEI personnel meet to help coordinate policy and direction for technology in learning and teaching. The Department's focus, which is shared by the leading schools that were contacted, is to integrate technology in curriculum and instruction in the island's schools.

Naturally, local school and district leaders have extended these initiatives in various ways. Some new schools, as part of their mission, have been built with technology while some established schools, through the leadership of a champion, have reinvented themselves using technology in learning and teaching. In the 1998-99 school year, one school district created a leadership position in technology. This individual, who has close links with the Department of Education initiatives, endeavours to empower school champions by understanding where each school is technologically and supporting them in their efforts to achieve their school's educational goals through technology. In PEI, the Department of Education acts as a hands-on catalyst for the use of technology in learning and teaching.

Case 3.4

The Resource-based Model
Contact Person: Eleanor Matz, Instructional Resources Unit, SK

The primary characteristic of this project, the Evergreen Curriculum which was based on resource-based learning is presented to teachers as a support for and perhaps a solution to, the implementation of a curriculum innovation of significant duration. Thus, teachers view this professional development project, and the inherent technology, not as another item to integrate into their lives but as a helpful means of implementing a mandated curriculum reform.

This year the project will directly reach approximately 300 primary and secondary school teachers from over 100 school districts. These teachers, in turn, will act as leaders, formal or informal, depending on the individual district/school, for their colleagues.

The project, which is series of one-day workshops, half theory and half hands-on, takes place during school time and involves synchronous learning activities, supported by home-generated Web-based resources (with supplementary links and an increasing number of curriculum resources published in CD-ROM format.

The project aims at teaching and encouraging teachers to use web-based information and to use the Internet as a means of communication and, thus, emphasizes integrated cross-curricular activities, in the context of other forms of innovative teaching.

Teachers have free access to computers while in session. Both incentives for teachers to purchase computers as well as the number of computers in the schools and classrooms is dependent upon the policies of the individual schools and districts.

The project is very much an initiative of the SaskEd Curriculum and Instruction Branch and embedded in the Evergreen Curriculum, and, as such, has clearly-stated goals and expected outcomes

While there is some evidence that teacher engage in more reflective practice and critical inquiry, the effect on other school improvement benchmarks cannot yet be determined.

The funding for this project comes from new funds.

While formal evaluation results remain pending, immediate direct and subsequent indirect feedback from teachers indicates a high degree of satisfaction. In particular, more teachers want technology in their classrooms. Teaching approaches appear to be becoming more student-centered resulting in authentic student productions.

This project's schools benefit greatly from hardware, software and infrastructure funded by Industry Canada in addition to a significant number being involved in Schoolnet Grassroots projects.

Case 3.5

The Yukon Technology Plan Implementation Model
Contact person: Joanne Davidson

The Yukon Territory has a population of 32,000 people, with 22,000 living in Whitehorse. Fourteen of the Territory's schools are in Whitehorse, with another fourteen located throughout the Territory, covering nine different languages and ranging in size from 5 students to 1,100 students.

While the core curriculum follows that of B. C., the goals of the remaining 20% of the curriculum reflect the diverse needs and interests of the various communities, with learning strategies and locally developed programs and resources bringing these goals to reality in the classroom.

With three professional days annually, the Yukon Technology In-service Plan aims to satisfy the needs of approximately 400 teachers and 200 other educational professionals while competing with the need for parent meetings and other accreditation-driven requirements.

In Whitehorse, teachers are likely to participate as individuals, while in the remote communities, the staff participate as a group.

The formal sessions are face to face and increasingly on teacher time, while follow-up is online and asynchronous. Given the diversity of needs and teachers abilities, the content generally assumes basic skills and progresses through to techno-pedagogical skills towards higher level collaboration skills and vision building with an emphasis on teachers, parents, and students working together.

The Territorial Plan contains clearly-stated goals and expected outcomes, with as much role modelling as the circumstances of geographical disparity permits; this latter forces the consideration of teachers' beliefs and perceptions.

In this same regard, the geographical disparity makes it difficult for Territorial personnel to judge the ultimate effect of the sessions, but there are indications that team-building and teamwork is increasing, teachers are beginning to engage in action-research and a collaborative culture is developing.

While there has not yet been a formal evaluation, teachers are very appreciative of the sessions and approximately 60% of them use ICT routinely.

Further, more teachers want technology into their classroom, teaching approaches appear to be increasingly constructivist, with more information-rich and open-ended inquiry-type learning projects and teachers engage in more substantive discourse both among themselves and with learners.

Case 3.6

The Inter-institutional Model

Contact persons: Japp Tuinmann, Open Learning Agency, BC
Réjean Payette, Société GRICS, Montréal, QC

Networks enable different educational organizations to engage in distributed ways of offering professional development in different ways. For instance, The Open Learning Agency is extending the services that its Open School provides. For instance the Teaching and learning in an information technology environment Program (TLITE) is a two-year, 30 credit post-baccalaureate

diploma developed in partnership with Simon Fraser University. The program is online, self-directed, collaborative, and based on a personal mentorship model. Summer institutes must be attended, and participants then have an opportunity to discuss face to face what they might have shared, struggled with, or solved together when working online.

The initiative of the Société de gestion du réseau informatique des commissions scolaires (GRICS), with a grant from the Fonds de l'autoroute de l'information, has invited Quebec Faculties of Education to collaborate in the promotion and design of courses that relate to ICT in teaching and learning. The web-site EducaTIC (http://educatic.grics.qc.ca) was created to this end. It presents the professional development programs and initiatives being taken throughout the province. A first course involving a few universities is being planned.

Case 3.7

The Annual Meetings of Professional Educators Model

The annual meetings of the Technology Planning Institute in British Columbia (TPI) and the Association québécoise des utilisateurs d'ordinateurs au primaire et au secondaire (AQUOPS) and their related events are entirely devoted to the integration of ICT in teaching and learning. Numerous other organized gatherings invite keynote speakers on today's technology, and/or include presentations and workshops within their program. The success of this form of professional development has been recognized through the large number of educators that traditionally attend.

Case 3.8

The Activities of Professional Associations Model

There are 11 Canada-wide teacher associations represented on the Internet. In addition, each province also has it's own teacher associations, for a cumulative representative total of 63 provincial teacher associations across Canada. Nationally and provincially, teacher associations currently provide limited online professional development opportunities to teachers as it relates to applying educational technology resources to the classroom. In contrast, many provincial teacher associations are working in collaboration with provincial ministries and organizations to offer face to face courses, workshops, seminars and conferences relating to the adoption of educational technology. Approximately 35% of all provincial teacher associations are currently providing teacher professional development towards implementing online resources and tools in the classroom.

Here are some examples:

The Canadian Association of Second Language Teachers in collaboration with TV Ontario (http://www.tvo.org/pdonline/) is offering 3 media-based professional development opportunities relating to online teaching and learning: (i) two online courses, (ii) video broadcast and (iii) Internet-based discussion.

Alberta's Professional Development for Teachers in Alberta, Canada (http://tlt.edmonton.ab.ca/) is offering an innovative new 3 part program that supports teachers as they develop knowledge and skill in using technology to support student learning. The program is called Teaching and Learning with Technology (TLT). The program covers skill-building, technology across the curriculum and technology leadership and mentorship.

British Columbia's College-Institute Educators' Associations of British Columbia (http://www.vcn.bc.ca/ciea/freent5.htm) in collaboration with the Centre for Curriculum Transfer & Technology (http://www.ctt.bc.ca/edtech/) is offering a two-day workshop entitled "Spring Camp '99 - Workshop on Educational Technology". This workshop aims to provide educators with opportunities to tour labs that develop tools and resources for instruction using educational technologies, to attend workshops, labs and demonstrations to discover how colleagues are using technology in an instructional setting and to network with colleagues to discuss and exchange information.

The Association d'éducation de langue française (ACELF) offers its members a web-site that include a collaborative space for sharing ideas, and resources, including a number of learning activities (http://acelf.ca).

A significant portion of professional development opportunities offered by teacher associations are comprised of an annual conference. For example, The Computer Using Educators of British Columbia (http://www.bctf.bc.ca/CUEBC/) offers "Horizons'99 : Networking for the New Millennium" as it's annual teacher professional development event for 1999. The objective of Horizons '99 is to network both computers and people to better integrate technology into the k-12 classroom. The most advanced is the Education Network of Ontario:

Case 3.9

The Network Model
Contact person : Mary Beam, Toronto, ON
http://www.enoreo.on.ca

The Education Network of Ontario (ENO) is a full-service educational Internet provider, including but not limited to dial-up and Web-based Internet access with bilingual online registration, email, teacher and student personal and project web pages and model classroom applications.

ENO has more than 60, 000 registered members/educators, with 10, 000 students per year involved in projects in Ontario and across Canada. ENO houses 180 Intranet

conferences/newsgroups and 33 operational projects initiated by teachers and students. A particularly interesting project is Marsville which involves more than 6, 000 students in a four-month long online program with nine link-up day locations across Canada involving video-conferencing with the Canadian astronauts at NASA.

Classroom projects include the Flat Stanley Project, a science/computer science online course, a senior English course, and a digital Internet radio station.

ENO is currently involved in an online Professional Development Institute with academic and industrial partners working on a training project which will hire 90 education graduates to assist teachers with telecommunications skills and the integration of technology and science in 25 School Boards.

ENO is also working with a French educational resource provider and the University of Ottawa to create an interactive web site to teach the political, geographic and cultural context for the francophonie and the international francophone games, Les Jeux, in Ottawa and Hull in 2001.

ENO has entered into a research relationship with 3Com towards equipment upgrades to offer 56 kbps access and to serve ISDN users across Ontario. It is beta-testing Internet telephony, facilitates infrastructure projects and contracts among boards and Ministry of Education agencies, and has partnered with Industry Canada to implement ENO's conferencing system for SchoolNet.

Case 3.10

The Tele-education Model
Contact person: Rory McReal, NB

TeleEducation NB offers several online courses. It's bilingual web-site features links to a number of online courses based in Canada to educators (http://database.telecampus.com/home/) (http://acular.pps.ca/telecampus/). For instance, its web-site features a course in Technology in Education : Designs for Learning: Educational Uses of Computers, offered on the Web by Simon Fraser University. The course introduces various types of computer applications in education and requires the students to learn through reading, interacting with others, and working with a computer. Different ways that computers might influence learning and teaching are examined. The following topics arecovered: 1) Approaches and issues in using computers in the classroom; 2) Evaluation of educational software; 3) Methods of integrating software into the curriculum to address students' learning needs; 4) Basics of using productivity software and introductory programming; 5) Communications and conferencing via computers; 6) Multimedia in the classroom. To register for the cours, the minimum level is: Post-secondary 3rd year, and the maximum level is: Post-secondary 4th year. This course is also part of a program offered by SFU and the B. C. Open Learning Agency.

Case 3.11

The Third-party -initiative Model

Initiatives may also be undertaken by third persons or parties (youth, parents, consultants, government agencies, retired teachers/elderly people, and private partners). For instance, Human Resources Development Canada (HRDC) initiated the Youth Employment Initiative (YEI). Among others, it provides significant help to teachers aiming at learning to use ICT. Participating provinces have developed different models to offer this assistance (see the Report on Youth Employment Strategy, McConaghy, 1999). HRDC's Office of Learning Technologies (OLT) provides an online professional development site to practitioners (http://olt-bta.hrdc-drhc.gc.ca/pract/profdev.html). The SchoolNet Support Parent initiative is a model which emerged from Manitoba and which has been quickly implemented in PEI and in Newfoundland and Quebec in the near future.

Last but by no means least, SchoolNet's Canada (http://www.schoolnet.ca) has been a powerful catalyst in the development of the electronic and social infrastructure. SchoolNet's Support Teachers Program (see Egnatoff, 1996), and the GrassRoots Program are important initiatives towards professional development. SchoolNet has awakened, inspired, and enabled thousands of professional educators.

Chapter 3

Teacher professional development: Full spectrum, full picture?

This report presents a wide variety of models (33) in relation to programs and and initiatives that are currently taking place in Canada. At first glance, the breadth of the models put into practice show that a great variety of professional development activities are in place (11 models were identifed at each level: school, district, or department). Their scope appears broad, until one considers the issues of scale (access to connectivity), content (a diversity of needs), process (leadership, eco-system, partnership, creativity), and success (accountability measures). Models may be innovative, but they are applied at a thin level, and on a smaller scale than what is needed in the knowledge-based society. A great percentage of educators are yet to get involved in learning to use effectively information and communication technologies (ICT). Given the number of professional educators throughout Canada (over 300 000), this represents a huge professional development undertaking, with possible devoted resources limited to local sites. In summarizing this report, the review team briefly addresses some basic questions relating to teacher professional development.

What is involved?

Professional development is both a personal and an organizational issue. In some cases, self-managed teachers direct their own growth in ways that interface with their school development plan. Additionally there are instances where school-based professional development training meets the professional needs and interests of local teachers only. As denoted in many of the cases, "moving the baseline up" is a concern. In nearly all cases, teachers are in a position to use or learn to use email, navigation skills, etc. Many also apply (or learn) a set of complex pedagogical skills that relate to cooperative learning, integrated curricular activities, project-based learning, communities of learners, etc. To advance these different levels, the majority of cases presented a multi-layer approach. To acknowledge the complexity of the situation at hand, many dimensions were considered at once.

Complex models instead of simplistic ones, ones that stage a number of follow-ups for instance, are likely to be successful in the long term. It is suggested that the Committee considers a long-term approach. The transition that has begun is likely to indefinately last. Early results are of a process-oriented nature (Bracewell et al, 1998). Changes in learning outcomes cannot precede ones related to context and process.

Who is involved?

Bottom-up up change and top-down support, is an increasingly acknowledged approach. In any innovative school setting, there are a number of players. Social interactions in relation to professional development follow three basic models. The one-to-one model may involve a colleague, a student, the school principal, or an expert. For instance, high school students skillful in IT support high school learners involved in helping teachers in a number of planning, and delivery modes (see Wolfson and Willinsky, 1998). The one-to-many model, that is, one instructor teaching to rather large numbers of individuals, has been the one which to-date has provided the most flexibility when economies of scale were necessary. This model is preponderant (lectures and other presentations during professional development days), and is likely to remain as such as long as the majority of teachers do not have sufficient access to online resources and tools. As illustrated by Bull, Heinecke, Walker, Blasi, and Willis (1998), the "one-way flow from instructor to students does not address the possibilities of interactive and collaborative education between students in different sites" (p. 48). Generated by factors which include the increase of electronic connectivity, and emerging professional development needs, applying and supporting a several-to-several model may be partly met through Internet-based tools. The Education Network of Ontario is such a model.

The descriptive categories used at the onset of this review which captured the modes of interaction through which the professional development initiatives and programs were being carried out (face to face interaction, face to face and online interaction, and online interaction) led us to the conclusion that two modes of interaction are included in several instances. Thus, one may say that professional development seems in a state of evolution as far as who is interacting with whom.

What is learned combining face to face and online communication?

- Awareness raising activities. Ones pertaining to the socio-technical infrastructure that is unfolding (electronic and social networks, banks of information, online resources and tools).

- Technology skills. Tool-specific training: for instance, email, list servs, forums, Internet search, Web-publishing.

- Applications to curriculum. Models which stress less or more complex content (see also Teach for Understanding, Bereiter, 1999)

- Pedagogical skills. Diverse possibilities (teaching of a topic, new roles) to the development of new classroom routines to accommodate emerging new roles for teachers and learners, as well as advanced learning models such as project work (project-based learning, project-based coll. learning), and knowledge-building communities (e.g. The learning paradigm).

- Communication/collaboration: Skills (one-to-one communication, one-to-many communication, online discussions: monitor, advise, manage, etc.).

What works?

Building on both the conceptual elements outlined in Chapter 1 and the cases reviewed, the following elements stand out as critical:

1) partnership and collaboration: between schools and other organizations such as faculties of education;
2) inclusiveness: of teachers in the design of their own development, and of all students in the expectation for improvement;
3) inquiry: long-term reflection and research on practice;
4) renewal: an openness to inventing new ways of doing.

The conditions of the effective use of online resources and tools were identified (Bracewell et al., 1998) as being the following:

- Access (to all learners, including teachers)
- Support (including professional development for teachers)
- Facilitation (of student learning)
- Constructed content (in combination with pre-organized content)

It is important to acknowledge the above multidimensional aspects of professional development when one wants to successfully encourage teachers to integrate communication and information technologies into their practice.

What does not work?

Studies of various types of computer uses make different assumptions about teachers' roles in a computer-using classrooms. For example, as pointed by Kirkpatrick and Cuban, the majority of studies focused on computer-assisted instruction (CAI) and computer-managed instruction (CMI), both of which de-emphasize the teacher's role in helping students learn. Teachers' resistance grew, and many teachers remain today afraid of losing their jobs as computers are integrated into the educational realm. Kirkpatrick and Cuban go on to say:

> Few studies focused on computer-enhanced instruction (CEI), in which the teacher is considered essential to the learning process. CEI differs from CAI and CMI most noticeably in that its programs provide less structured, more open-ended opportunities that support a particular lesson or unit plan. Use of the Internet, word processing, and graphing and drawing programs are examples of CEI.

Educational administrators that understand the role of the teacher in motivating, probing, encouraging, instructing, and challenging young learners govern themselves in such ways as to reassure teachers of their role in a knowledge-based society.

Shortcomings identified by respondents often related to access issues, and lack of resources for professional development.

What are the models ahead?

Professional development requires support of many kinds, and at different levels (technical, pedagogical, administrative). Face to face support meetings can be supplemented with others forms provided online. More complex models connect technology to teacher education, curricula, and resource allocation.

The anticipated trend is the increased diversity in the uses of ICT, within a school (e.g., the coexistence of network-enabled classes & non-network-enabled classes) and across schools in the same area (a laptop school co-existing with schools experimenting with other models of ICT that are more relevant to their vision, purpose, preferences, and capacity). The diversity of ICT use will also be accompanied by the diversity in professional development initiatives. This diversity probably will no doubt continue for some time, and it is not likely that a single model will emerge as the solution for all schools in Canada. This diversity is healthy and fruitful to the extent that it is embedded in a reflective practice that centres around thoughtful experimentations, signaling to others and sharing with them the knowledge that is constructed from this practice (see the notion of collective intelligence by Pierre Lévy).

A related anticipated trend is the increased investment into teacher professionalism that emerges as a necessary condition of professional development in/with ICT. This contrasts with other approaches that are skill-based, short-term, and that isolate ICT from teaching and learning (such as they still appear in many places). In our discussions with educators and administrators about ICT and professional development, it is clear that there is increased pressure from the community outside the school for teachers to "use technology", and it appears that a promising response is to support the teacher as a reflective practitioner and one who is a knowledgeable member of a community of learners, and is empowered to make appropriate decisions based on this knowledge.

Teachers continue to be encouraged to see themselves as lifelong learners, and should be supported in their attempt to negotiate a satisfying "new teaching role" within a revisited notion of good practice (see Bullough, 1992, quoted by Wideen et al., 1998).

Recommendations

Given the above initiatives and programs already underway, the SNAB Committee may advance on two fronts: 1) building upon the capacity for professional development at all levels (meaning maintaining the same or similar SchoolNet programs and increasing numbers of participating teachers), and 2) moving towards the next level of solutions. In order to contribute to the decision-making process of the Working Committee on Professional Development in relation to recommendations to the SNAB Committee, the following opportunities are raised as being highly relevant:

Fostering partnership

SchoolNet has encouraged partnerships in its programs such as GrassRoots, and the most recent Network for Innovative Schools. The challenge now is to advance beyond early adopters to the building of a critical mass of partnership-oriented professional development activities. (Possibility: The co-construction of curriculum-related web-sites)

Providing online opportunities to learn about and with technology

Given the pace of the integration of computers and networks in the daily professional and personal experiences of those living in Canada and elsewhere, combining face to face and online teacher learning activities appears relevant. The number of cases where such combinations currently exist was surprisingly high, compared to what was anticipated during discussions conducted by the Working Group Committee. The recommendation therefore is to focus on mixed models while remaining attentive to the needs of the many who have limited experience and/or exposure.

Funding the design of technologies that support professional development

The enactment of new practices is best supported when accompanied by discussion and analysis of the events (Marx et al, 1998). The design of supportive tools such as casebook of project practices, productivity tools such as visualization tools (concept maps, for instance), tools for graphical representation, and IT systems such as domain-specific MOOs (Multi-user, object-oriented applications) could be most instrumental.

Building on promising individual or group results

SchoolNet could provide an incentive for teachers to share and use one another's creative materials resulting from their involvement in professional development activities. In this case, the funds would go to the user of, instead of the creator (see the GrassRoots Program). The DayBook Project in B.C. is an example of what might be: The model is online-based: resources and teaching notes for delivery of integrated informational technology units in all disciplines are provided. The site is maintained technically by the members of the teaching editing committees and their editing counterparts with BCTel Interactive. So far, this has produced 225 lessons for a cost of $4000. It is being reported that the trend is catching on, where a teacher who uses a lesson contributes a lesson that has already been used, with teaching notes on how and why.

Connecting Industry Canada's Initiatives

To connect the LearnWare Initiative with professional development programs. To also integrate face to face and online professional development activities within the same model.

Providing Industry Canada's and partner companies' expertise in time reallocation

Today's leading-edge companies are successfully reallocating how time is productively used. Project and team work management is now replacing the assembly-line model as computers successfully complete numerous more and more intricate operations. The successful experience gained by industry could be applied by schools ready to engage in a similar reorganization in the use of time. The Netherlands are promoting a 15% time reallocation towards project-based learning. SchoolNet could consider initiating a new program that would support schools, school districts, and provincial departments of education willing to engage in the elaboration of a plan to reallocate specific periods (i.e.: one-day a week; Monday mornings and Friday afternoons) to project-based learning.

Supporting the renewal of leadership and management

In a regional or district-wide initiative peer-coaching in cascades seems inevitable, to all appearances a consequence of "central management" in large organizations which look at the large

number of "trainees" and the small number of initial "trainers". Very few cases, however, emerge with a clearly "re-engineered" approach to management that would resemble the experiences of decentralization, empowerment, disintermediation, and "distributed organizations" in the current corporate world who functions in this "new economy" (Browning, 1998). Professional development initiatives should be more attentive to this administrative context and provide support for renewal of leadership and management.

Researching on the successful professional development models

The report presents the terminology and philosophy of ProD in/with technology today in Canada, and we believe that making more public this knowledge and this discourse is a positive way of promoting further discussions and reflections on this topic. Thus, it becomes possible upon reading this report to notice additional common characteristics of professional development and to raise questions about them. An example of such characteristics and questions is, in the case of District-wide ProD, the assumption that teachers come to professional development as "representatives" of their school and when returning to their school they will disseminate the knowledge and the information they have acquired; a related question is: under what conditions is this model effective?

The next step could be to enlarge the database of cases that this one-month review allowed to begin to accumulate and codify, and provide an online template for interested individuals to fill; to complete the process, a phone interview would follow. Iterative analysis of the corpus could lead to a rather strong conceptualization of the possibilities and challenges of professional development in the networked world of teachers and learners.

An evaluation of the models would also be most worthwhile as very few respondents could, quite understandably, clearly identify objective outcomes at this point in time. In line with the integrative perspective adopted in this report, it is recommended that program or initiative outcomes be evaluated in relation to their process (from early stages planning to follow-up activities), and in a multi-faceted manner: changes for teachers, schools and their partners, students, and educational systems.

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Appendix A

Terms of Reference

SNAB Working Group on Professional Development

To report on practices and models used in professional development for in-service educators, K-12 as they integrate ICT into learning.

- Review literature on existing programs for the professional development of in-service educators in integrating ICT into the curriculum. The review will include documents/reports published in the last two years by universities/research institutes and by provincial/territorial Ministries of Education, on the professional development of in-service educators, K-12, focused specifically on the integration of ICT into learning. Examples of such documents are:

    - Report on Professional Development and Learning Technologies, by the Canadian Alliance of Education and Training Organizations & Office of Learning Technologies, November 1998;

    - Report by Egnatoff, Queens University, prepared for SchoolNet;

    - The CEMIS in the province of Quebec, etc.

- Contact selected provincial/territorial Ministries of Education, School Boards, and professional associations to get information about the availability of professional development programs for in-service educators and documents describing these programs. Identify exemplary practices and models, including online delivery. The study should also identify major barriers and gaps in the professional development of in-service educators in integrating ICT into learning. The study will also include the results obtained from the use of programs such as Youth Employment Strategy, GrassRoots, and other federal or provincial initiatives that have been used to assist teachers in the integration of ICT in learning.

- On behalf of the Working Group on Professional Development, prepare a final report to be submitted to the SchoolNet National Advisory Board (based on item 2).

- Submit final report to the SNAB Working Group on Professional Development.

Timeline

The final report must be submitted to the SNAB Working Group on Professional Development no later than March 12, 1999.

Appendix B

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Appendix C

Template

Pro D plan, project, program: .....
Submitted by: .....

Sector of practice	Primary ( )	Secondary ( )	Postsecondary ( )	Comment/Other
Participants	Individual teachers ( )	School staff ( )	School district personnel ( )	
Size	# of teachers ( )	# of schools ( )	# of school districts ( )	
Time	School time ( ) Teacher time ( ) Summer time ( )	Synchronous learning activities ( )	Asynchronous learning activities ( )	
Content	Learning about technology Technology skills ( ) Hardware ( ) Software ( ) Internet ( ) Intranet ( ) Web-based Information ( ) Communication ( ) Student-Web interactions ( )	Learning with Technology Pedagogical skills ( ) Add-on activities ( ) Curriculum-related activities ( ) Informatics ( ) 2nd language ( ) Science ( ) Language arts ( ) Math ( ) Others ( )	Learning with Technology Collaboration skills ( ) Network awareness ( ) Vision building ( ) Administrators, teachers, & parents work together ( ) Teachers, parents, and students work together ( )	
Combined w/ other forms of innovative teaching	Integrated curricula ( )	Project-based Learning ( )	Cooperative learning ( )	
Access to network computers	At the ProD setting Limited ( ) Free access ( )	At home Using school computer ( ) W/ incentives ( )	At school School lab ( ) Staff room ( ) Classroom ( )	Comment/Other

Management	Isolated Plan/Program ( )	Ecosystemic Initiative ( )	Source of initiative Administration ( ) Teachers ( ) Parents ( )	
Locus of control	Provincial Plan/Program ( )	School districts(s) Plan/Program ( )	School-based plan/ program/project ( )	
Top-down support	Clearly-stated goals & expected outcomes ( ) Role modeling ( ) Teachers' beliefs & perceptions considered ( )	Focus of support as regards teachers' use of technology Type-I (usual) applications ( ) Type-II (new) applications ( )	Techno-pedagogical support provided between & after ProD activities Face to face (F2F) ( ) F2F & Online ( ) Online ( )	Relaxed control & structure ( )
School Improvement Benchmarks	A clear sense of purpose & a shared vision ( ) Continuous training support provided in a variety of forms ( )	New leadership roles for the governance of schools ( ) Team-building & teamwork ( )	Reflective practice & critical inquiry ( ) Teachers engage in action-research ( ) Teachers have/bring a computer at home ( )	A collaborative culture ( ) Teachers share propositional knowledge (theory, methods, & skills) ( )
Cost	New funds ( )	New/ reallocated funds ( )	Reallocated funds ( )	External local resources ( )
Program Outcomes	% of participation ( )	% of satisfaction ( )	Formal evaluation results ( )	Teachers use ICT on a routine basis ( )
Success indicators	More technology-based interaction : human-machine ( ) human-human ( ) More teachers want technology into their classroom ( ) Time reallocation is permitted and encouraged ( )	More teaching approaches consistent with constructivism ( ) More student-centered activities ( ) Students feel better about what they are doing ( )	More information-rich & open-ended inquiry-type learning projects ( ) Better academic results ( ) Student produce genuine artifacts ( )	Teachers' talks about successes & missed opportunities ( ) More substantive discourse among teachers ( ) More substantive discourse with learners ( ) parents ( )